

# L3 CFT Tracking

Robert Illingworth

Ray Beuselinck

Chris Barnes

Imperial College, London

# CFT Tracking

## CFT only tracking

- Separate axial & stereo stages

- Axial

  - Link and tree algorithm

- Stereo

  - Hough transform

## Tracker conforms to standard L3 tracking tool interface

- Other tools have a (triggerlist controlled) choice of which tracker to use

# Tool certification

## Release

p11.00.00-maxopt + l3fchunk memory leak fix

## Stability

Ran CFT unpack + track over 27,000 assorted MC events  
(delivered to IC farm by SAM)

No crashes, no memory leaks

Ran 10,000 events in full (tsim\_l3) triggerlist

Took 28 hours, memory usage 143 Mb  $\Rightarrow$  898 Mb

# Performance

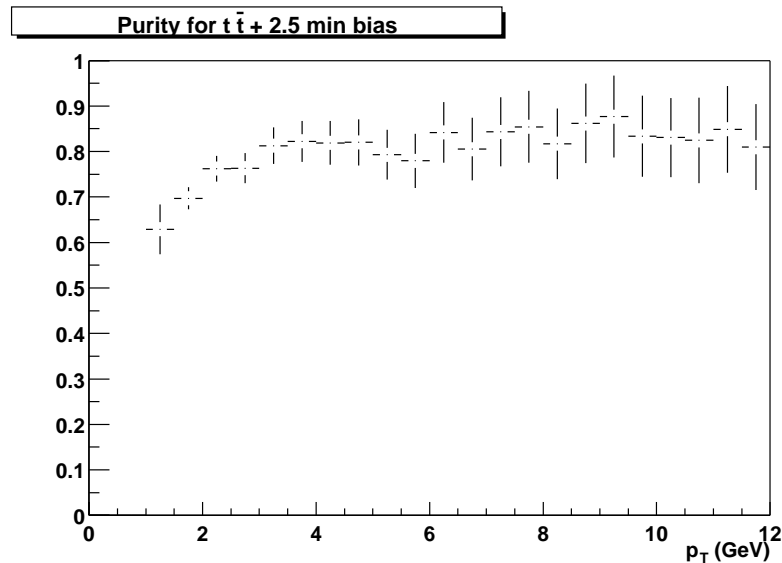
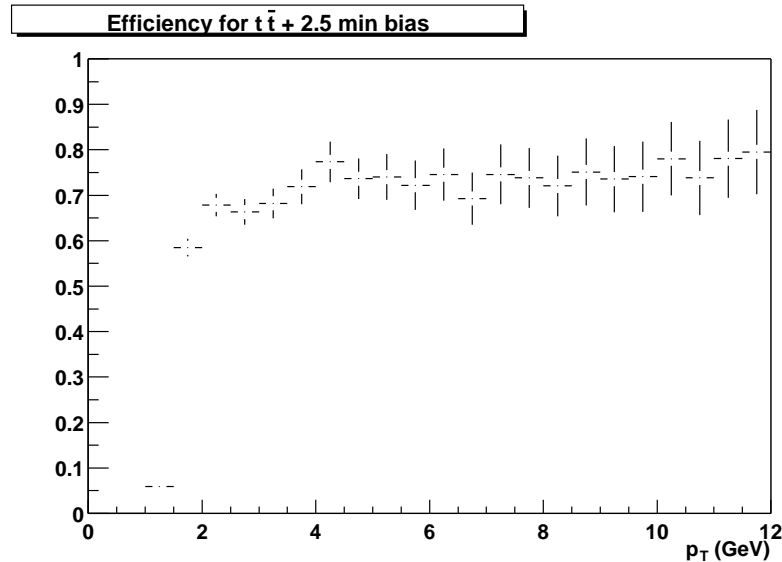
Old purity and efficiency determined using MC hits no longer present in newer MC data

Had to create new method using the available information (MCTrackChunk)

Unfortunately, apparently does not work on p10 MC data, so had to redo with p09 data to get results

- not processed a wide range of events yet

# Efficiency and purity



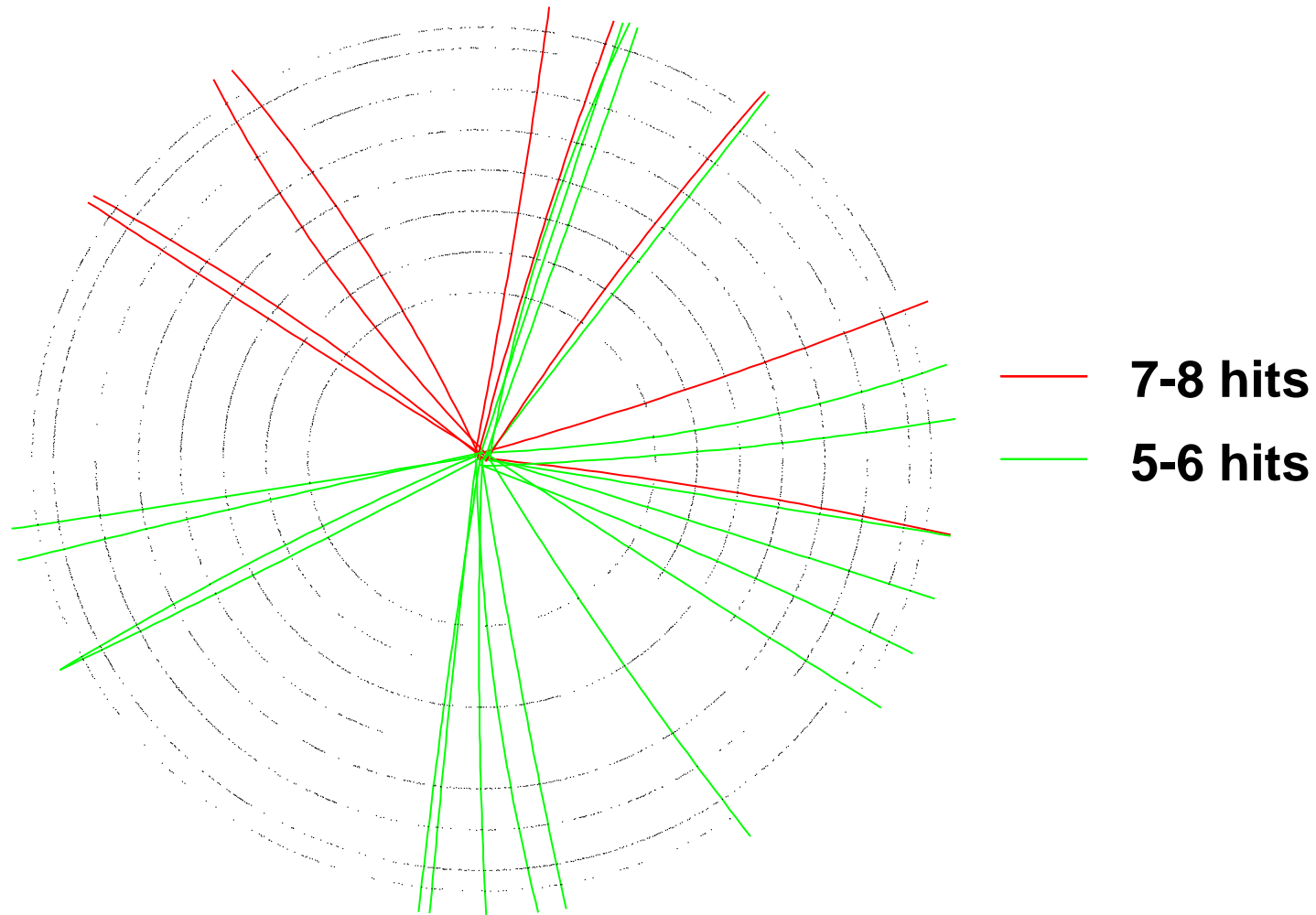
Efficiency and purity for top  
+ 2.5 average minimum  
bias

Efficiency flat ~75% above  
4 GeV

Purity ~80% above 3 GeV

# Real data

**Run 139930 Event 187364**



# Timing

Used Imperial Grid Farm to measure running times of tools

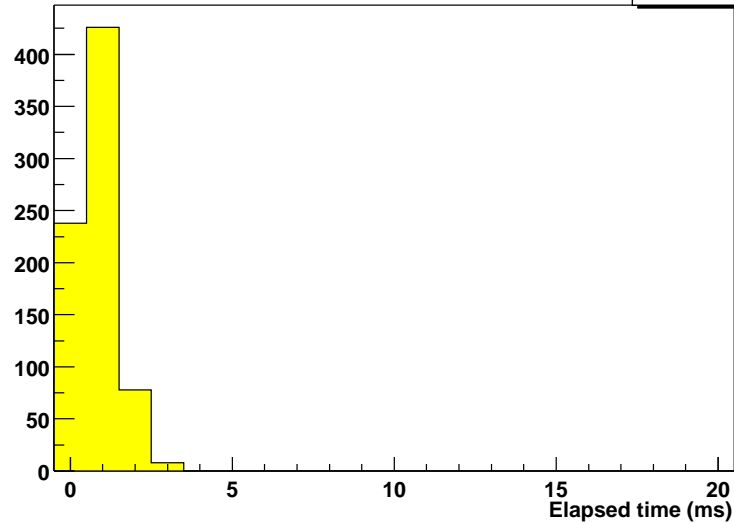
Farm machines are 1GHz dual CPU machines – comparable to filter farm

p11.00.00-maxopt release, running ScriptRunner\_x with minimal triggerlist (CFT unpacking + tracking)

# $Z \rightarrow ee$ no min bias

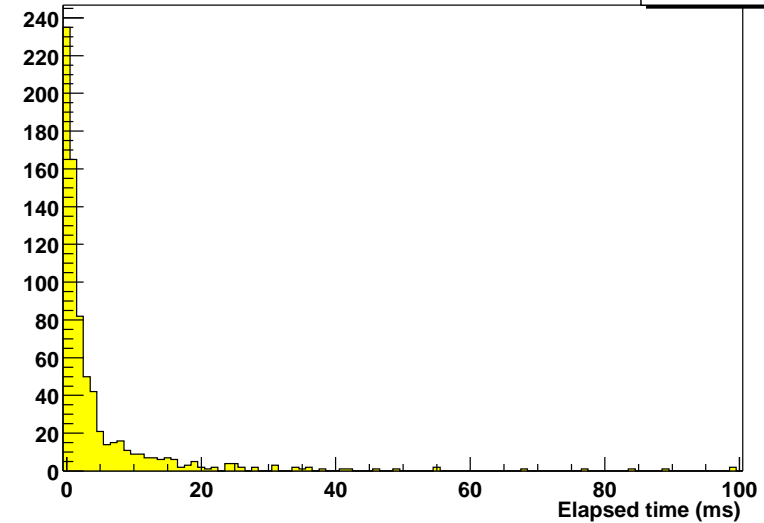
CFT Unpack and Clustering time:  $Z \rightarrow ee + 0$  minbias

Mean = 0.808  
RMS = 0.6536



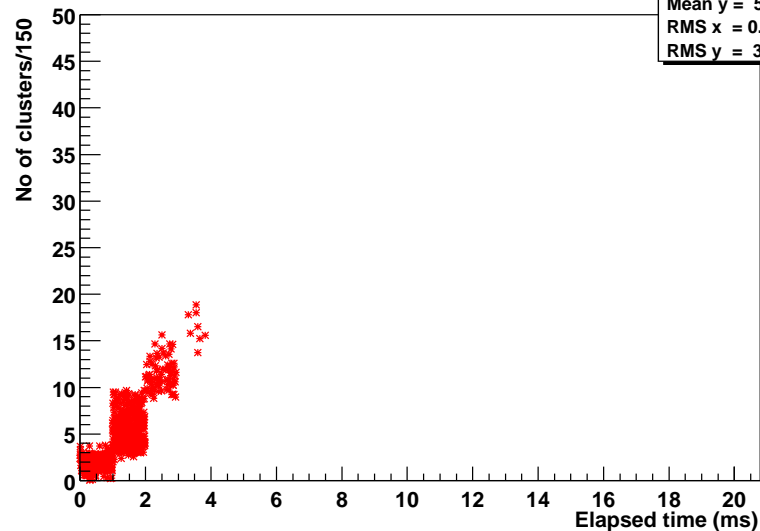
CFT Tracking time:  $Z \rightarrow ee + 0$  minbias

Mean = 4.692  
RMS = 10.34



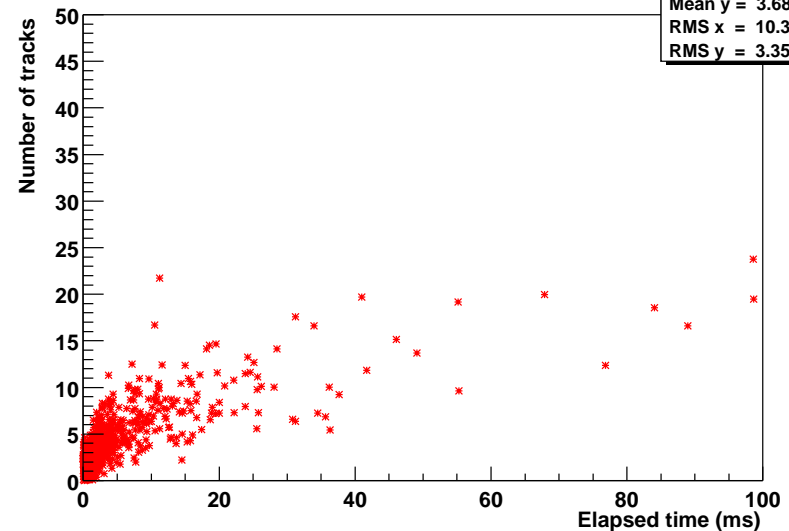
CFT Unpack and Clustering time:  $Z \rightarrow ee + 0$  minbias

Mean x = 1.295  
Mean y = 5.022  
RMS x = 0.6471  
RMS y = 3.279



CFT Tracking time:  $Z \rightarrow ee + 0$  minbias

Mean x = 4.692  
Mean y = 3.684  
RMS x = 10.34  
RMS y = 3.353

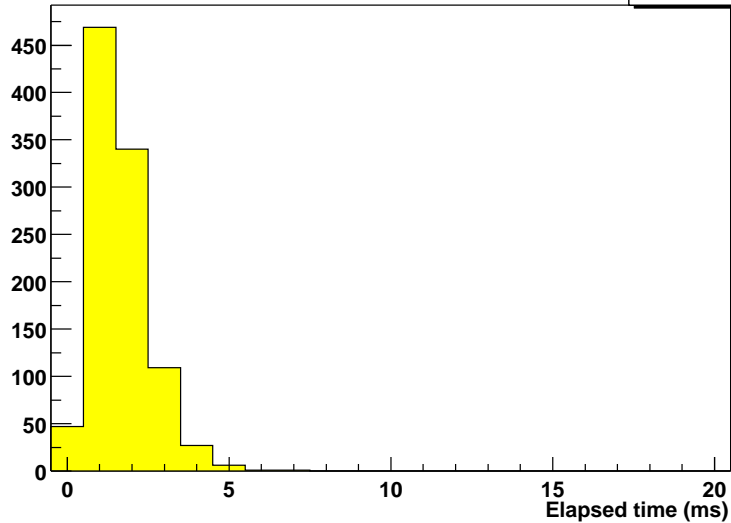




# $Z \rightarrow ee + 2.5$ average min bias

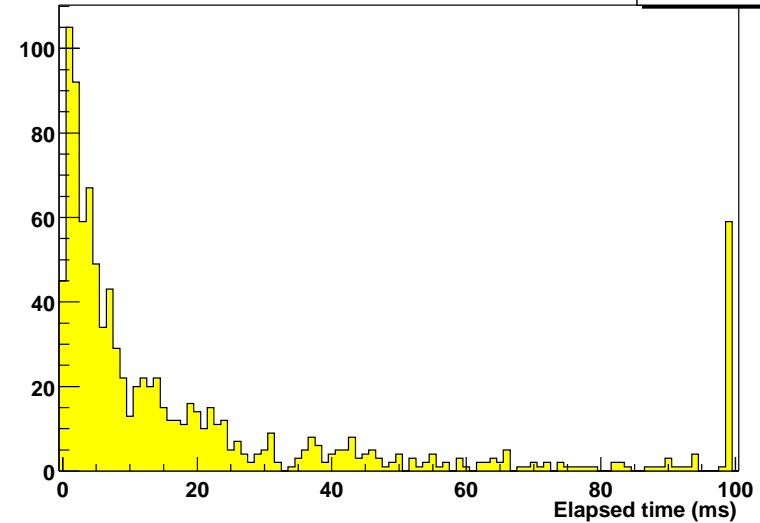
CFT Unpack and Clustering time:  $Z \rightarrow ee + 2.5\text{av minbias}$

Mean = 1.627  
RMS = 0.911



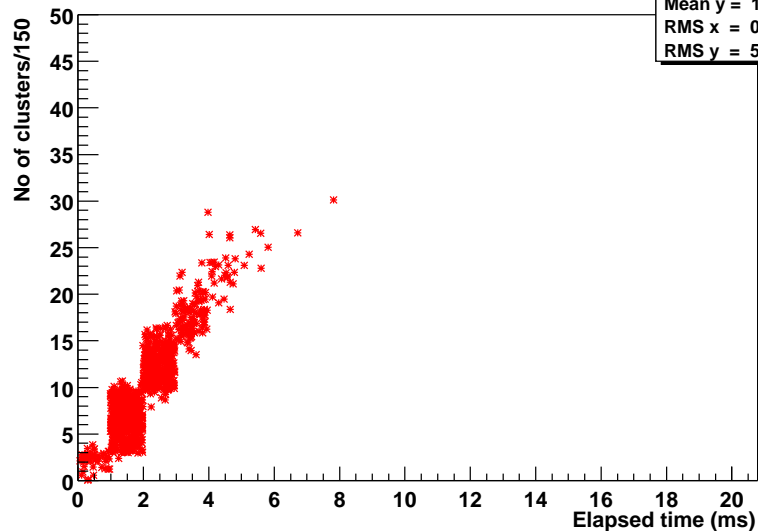
CFT Tracking time:  $Z \rightarrow ee + 2.5\text{av minbias}$

Mean = 19.94  
RMS = 27.28



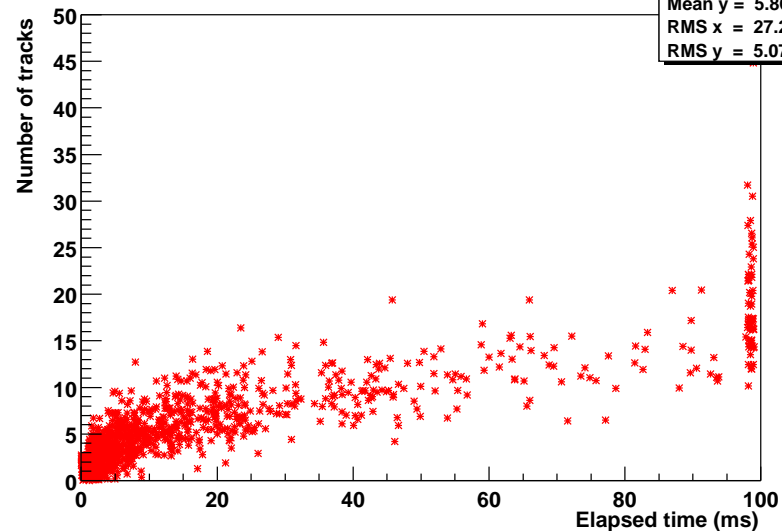
CFT Unpack and Clustering time:  $Z \rightarrow ee + 2.5\text{av minbias}$

Mean x = 2.106  
Mean y = 10.18  
RMS x = 0.902  
RMS y = 5.054



CFT Tracking time:  $Z \rightarrow ee + 2.5\text{av minbias}$

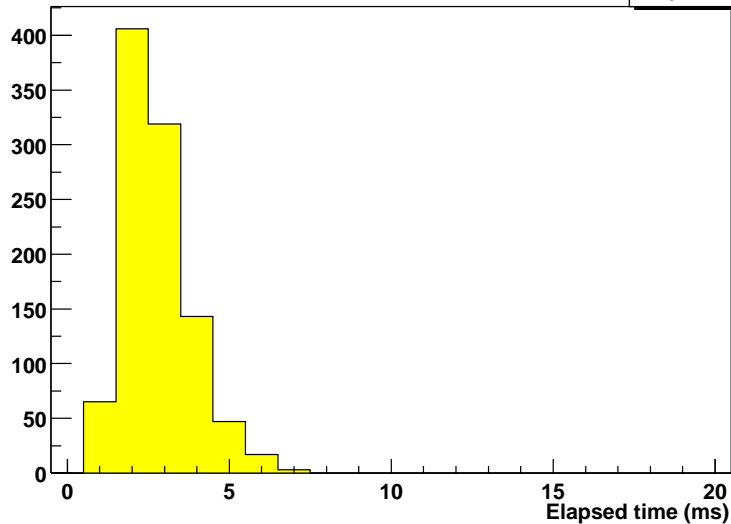
Mean x = 19.94  
Mean y = 5.865  
RMS x = 27.28  
RMS y = 5.079



# $t\bar{t}$ + 2.5 average minbias

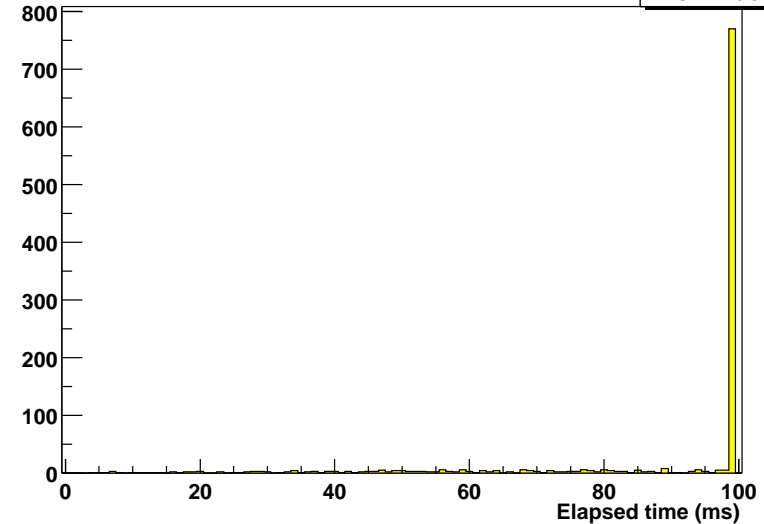
CFT Unpack and Clustering time:  $t\bar{t}$  + 2.5av minbias

Mean = 2.764  
RMS = 1.069



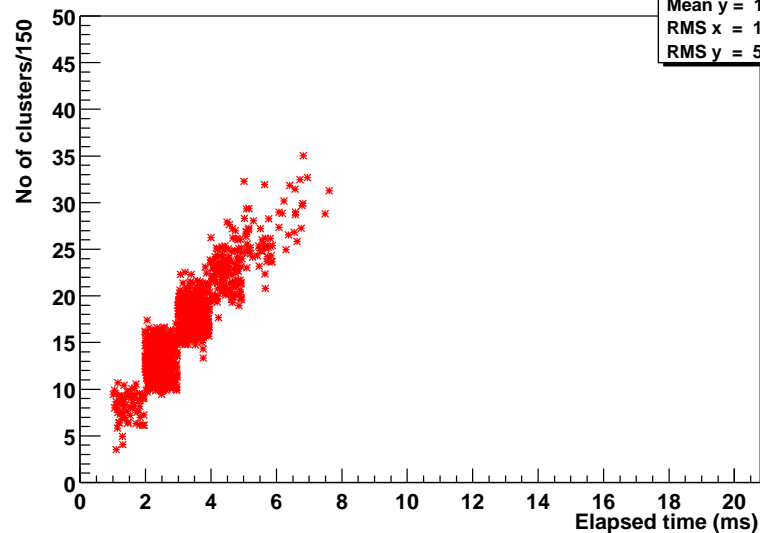
CFT Tracking time:  $t\bar{t}$  + 2.5av minbias

Mean = 89.85  
RMS = 20.54



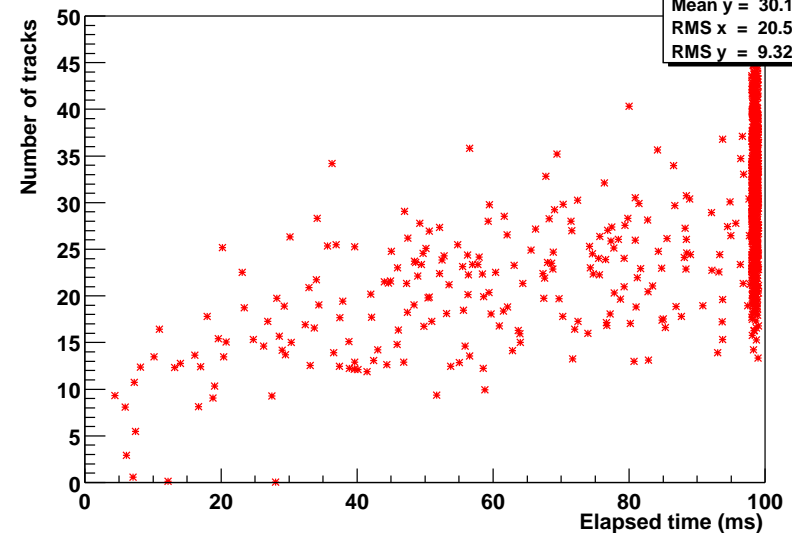
CFT Unpack and Clustering time:  $t\bar{t}$  + 2.5av minbias

Mean x = 3.232  
Mean y = 16.66  
RMS x = 1.058  
RMS y = 5.032



CFT Tracking time:  $t\bar{t}$  + 2.5av minbias

Mean x = 89.85  
Mean y = 30.18  
RMS x = 20.54  
RMS y = 9.321



# The future

Look at improving performance (physics and speed)

Improvements to CFT unpacking for real data

- Add per channel thresholds

- Geometry (fibre numbering) in the real detector causes unnecessary copying of clusters to get them in order – need to look at this